

## THE CLAIMS

The claims of the application, as amended, are:

1. – 9. (Cancelled)

10. (Currently Amended) Power generation apparatus comprising [[:]]:

a gas-fueled power generator;

two-stage reaction apparatus for producing a fuel gas product from a hydrocarbonaceous material, operatively connected to supply fuel gas to said power generator, said reaction apparatus including a pyrolysis chamber comprising a first stage thereof, and a second chamber containing a non-consumable catalyst, comprising a second stage thereof; and means for controlling the flow of fuel gas from said reaction apparatus to said generator, said reaction apparatus being constructed to enable ~~for~~ effecting a process comprising the following steps (a) through (d); ~~and electronic data processing means programmed to monitor the formation of at least one gas phase product for controlling said steps (a) through (d), carried out cyclically:~~ (a) introducing a non-gaseous hydrocarbonaceous material into said pyrolysis chamber[[: and]]; ~~(b)~~ (b) pyrolyzing the hydrocarbonaceous material in said pyrolysis chamber therein so as to produce a primary fuel gas mixture, a pyrolysis liquid, and a first carbonaceous residue; ~~(b)~~ (c) introducing the primary fuel gas mixture and the pyrolysis liquid into said second chamber, and heating said liquid therein, in a substantially non-oxidizing atmosphere, to a temperature of 900° to 1100° C and substantially above the temperature at which pyrolysis is effected in step (b) ~~(a)~~,

so as to produce additional fuel gases and additional solid carbonaceous residue, without substantially altering the composition of said primary fuel gas mixture; ~~(d)~~ ~~(e)~~ withdrawing the primary fuel gas mixture and the additional fuel gas from said second chamber; and ~~(d)~~ ~~(e)~~ introducing air, oxygen, carbon dioxide or steam into each of said chambers to effect reaction with, and at least partial removal of, said carbonaceous residue therein; and

electronic data processing means programmed for monitoring the formation of at least one gas phase product and for controlling at least said steps (b) through (e), carried out cyclically, based upon such gas phase product formation monitoring.

11. (Canceled)

12.- (Currently Amended) The power generation apparatus of Claim 10 wherein said at least one gas phase product for which ~~monitored by~~ said data processing means is programmed to monitor is selected from the group consisting of hydrogen, methane, carbon monoxide, carbon dioxide, water, and oxygen.

13. (Currently Amended) The power generation apparatus of Claim 10 wherein said data processing means is programmed to monitor the formation of at least three gas phase products ~~is monitored~~ for controlling said steps (b) through (e).

14. (Currently Amended) The power generation apparatus of Claim 13 wherein said data processing means is programmed to determine the concentrations of said at least three gas phase products, ~~and to implement an artificial neural network~~

~~model based thereupon, such concentrations being utilized as input data to said neural network.~~

15. (Currently Amended) The power generation apparatus of Claim ~~21~~ 14 wherein said neural network model is constructed to produce a fuel gas product of selected composition, from a specified hydrocarbonaceous material, by controlling the operating parameters from the first and second stages of said apparatus.

16. (Currently Amended) The power generation apparatus of Claim ~~14~~ 15 wherein said at least three gas phase products for which ~~monitored by~~ said data processing means is programmed to monitor are selected from the group consisting of hydrogen, methane, carbon monoxide, carbon dioxide, water, and oxygen.

17. (Currently Amended) The power generation apparatus of Claim 10 wherein said non-consumable catalyst in said second chamber is a silica gel-based catalyst.

18. (New) The power generation apparatus of Claim 17 wherein said silica gel-based catalyst is in the form of a fixed bed.

19. (New) The power generation apparatus of Claim 14 wherein said data processing means is programmed to produce a fuel gas product of selected composition, from a specified hydrocarbonaceous material, by controlling the operating parameters from the first and second stages of said apparatus.

20. (New) The power generation apparatus of Claim 19 wherein said data processing means is programmed to operate said apparatus in a closed-loop mode.

21. (New) The power generation apparatus of Claim 14 wherein said data processing means is additionally programmed to implement an artificial neural network model based upon the concentrations of said at least three gas phase products determined.